Name:

at1118paper: Complete the Square (v409)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 40x = -364$$

Add $\left(\frac{-40}{2}\right)^2$, which equals 400, to both sides of the equation.

$$x^2 - 40x + 400 = 36$$

Factor the left side.

$$(x - 20)^2 = 36$$

Undo the squaring. We need to consider both $\pm\sqrt{36}$.

$$x - 20 = -6 \quad \text{or} \quad x - 20 = 6$$
$$x = 14 \quad \text{or} \quad x = 26$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 - 22x = 840$$

$$x^2 - 22x + 121 = 961$$
$$(x - 11)^2 = 961$$
$$x - 11 = \pm 31$$
$$x = -20 \quad \text{or} \quad x = 42$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 - 8x = 128$$

$$x^2 - 8x + 16 = 144$$
$$(x - 4)^2 = 144$$
$$x - 4 = \pm 12$$
$$x = -8 \quad \text{or} \quad x = 16$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 + 36x = 1701$$

$$x^2 + 36x + 324 = 2025$$
$$(x + 18)^2 = 2025$$
$$x + 18 = \pm 45$$
$$x = -63 \quad \text{or} \quad x = 27$$

Question 4

By completing the square, find both solutions to the given equation:

$$x^2 + 56x = -208$$

$$x^2 + 56x + 784 = 576$$
$$(x + 28)^2 = 576$$
$$x + 28 = \pm 24$$
$$x = -52 \quad \text{or} \quad x = -4$$

Question 5

By completing the square, find both solutions to the given equation:

$$x^2 - 48x = -572$$

$$x^2 - 48x + 576 = 4$$
$$(x - 24)^2 = 4$$
$$x - 24 = \pm 2$$
$$x = 22 \quad \text{or} \quad x = 26$$

Question 6

By completing the square, find both solutions to the given equation:

$$x^2 + 28x = 288$$

$$x^2 + 28x + 196 = 484$$
$$(x + 14)^2 = 484$$
$$x + 14 = \pm 22$$
$$x = -36 \quad \text{or} \quad x = 8$$